

DEVICE-TO-DEVICE TRANSMISSION IN COMMUNICATIONS

FIELD OF THE INVENTION

[0001] The exemplary and non-limiting embodiments of this invention relate generally to wireless communications networks, and more particularly to device-to-device transmission.

BACKGROUND ART

[0002] The following description of background art may include insights, discoveries, understandings or disclosures, or associations together with disclosures not known to the relevant art prior to the present invention but provided by the invention. Some such contributions of the invention may be specifically pointed out below, whereas other such contributions of the invention will be apparent from their context.

[0003] Multicast services are becoming more and more popular with the development of cellular wireless networks (e.g. LTE networks), where data is transmitted to multiple recipients by eNB. An interesting multicast retransmission solution is in-band cooperative retransmission where one of the users who have already successfully received a packet is responsible for retransmitting the packet to users who have reported a negative acknowledgement (NACK) before. Thus the recipients in a multicast service may form a cluster to help each other in service data receiving.

SUMMARY

[0004] The following presents a simplified summary of the invention in order to provide a basic understanding of some aspects of the invention. This summary is not an extensive overview of the invention. It is not intended to identify key/critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some concepts of the invention in a simplified form as a prelude to the more detailed description that is presented later.

[0005] Various aspects of the invention comprise a method, apparatuses, and a computer program product as defined in the independent claims. Further embodiments of the invention are disclosed in the dependent claims.

[0006] An aspect of the invention relates to a method for providing an ad-hoc network, wherein at least one group of mobile devices operating as a device-to-device cluster having a currently elected cluster head device, the method comprises configuring, in a network apparatus for the device-to-device cluster, a cluster-specific cell-level radio network temporary identifier C-RNTI on the basis of each content-sharing service requested within the device-to-device cluster, wherein the cluster-specific cell-level radio network temporary identifier C-RNTI acts as a cluster-specific virtual radio access user responsible for transmission between a serving base station and the currently elected cluster head device on behalf of the device-to-device cluster.

[0007] A further aspect of the invention relates to an apparatus comprising at least one processor; and at least one memory including a computer program code, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the apparatus to, at least one group of mobile devices operating as a device-to-device cluster having a currently elected cluster head device, configure for the device-to-device cluster, a cluster-specific cell-level radio network temporary identifier

C-RNTI on the basis of each content-sharing service requested within the device-to-device cluster, wherein the cluster-specific cell-level radio network temporary identifier C-RNTI acts as a cluster-specific virtual radio access user responsible for transmission between a serving base station and the currently elected cluster head device on behalf of the device-to-device cluster.

[0008] A still further aspect of the invention relates to a base station comprising at least one processor; and at least one memory including a computer program code, wherein the at least one memory and the computer program code are configured to, with the at least one processor, cause the base station to, at least one group of mobile devices operating as a device-to-device cluster having a currently elected cluster head device, configure for the device-to-device cluster, a cluster-specific cell-level radio network temporary identifier C-RNTI on the basis of each content-sharing service requested within the device-to-device cluster, wherein the cluster-specific cell-level radio network temporary identifier C-RNTI acts as a cluster-specific virtual radio access user responsible for transmission between a serving base station and the currently elected cluster head device on behalf of the device-to-device cluster.

[0009] A still further aspect of the invention relates to a computer program product comprising program code means adapted to perform any one of the method steps when the program is run on a computer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] In the following the invention will be described in greater detail by means of exemplary embodiments with reference to the attached drawings, in which

[0011] FIG. 1 shows a simplified block diagram illustrating exemplary system architecture;

[0012] FIG. 2 shows a simplified block diagram illustrating exemplary apparatuses;

[0013] FIG. 3 shows a messaging diagram illustrating an exemplary messaging event according to an embodiment of the invention;

[0014] FIG. 4 shows a schematic diagram of a flow chart according to an exemplary embodiment of the invention;

[0015] FIG. 5 shows a schematic diagram of a flow chart according to another exemplary embodiment of the invention.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

[0016] An exemplary embodiment relates to a 3GPP LTE-A Rel-12 system, addressing an LTE-A support for network-controlled D2D communications. 3GPP TSG-SA1 is carrying out a study of services and requirements for D2D communications, referred to as proximity services (ProSe).

[0017] A potential ProSe use case is local content sharing in which a group of mobile devices involved in D2D communications, also referred to as a D2D cluster, are receiving and sharing the same on-line content—such as a multicast live event, film on-line or large multimedia file—which is being downloaded from an IP server or a remote user terminal via LTE/LTE-A cellular access primarily and using D2D communications for distribution of the shared content locally within the D2D cluster.

[0018] An exemplary embodiment considers selective and cooperative transmission schemes for efficient D2D based content sharing. This aims at (i) keeping the distribution of the